ORIGINAL

BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules	)	WT Docket No. 99-168
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	)	
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To: The Commission

CONSOLIDATED COMMENTS AND OPPOSITION OF TRW INC. TO PETITIONS FOR RECONSIDERATION AND/OR CLARIFICATION

TRW Inc. ("TRW"), by its attorneys and pursuant to Section 1.429 of the Federal Communications Commission's rules, 47 C.F.R. § 1.429, hereby comments on and/or opposes certain aspects of various petitions for reconsideration and/or clarification[1] submitted in response

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[1] TRW comments on and/or opposes certain of the following petitions in WT Docket No. 99-168: Petition for Expedited Reconsideration of U S West Wireless, LLC (filed Feb. 3, 2000) ("U S West Petition"); Petition for Reconsideration of Adaptive Broadband Corporation (filed Feb. 22, 2000) ("ADAP Petition"); Petition for Reconsideration of ArrayComm, Inc. (filed Feb. 22, 2000) ("ArrayComm Petition"); Petition for Reconsideration of the Association for Maximum Service Television, Inc. (filed Feb. 22, 2000) ("MSTV Petition"); Petition for Reconsideration of APCO and Opposition to Emergency Petition for Reconsideration of U S West Wireless, LLC (filed Feb. 22, 2000) ("APCO Petition"); and Petition for Reconsideration of U.S. GPS Industry Council (filed Feb. 22, 2000).

to the recent adoption of service rules for licensing commercial use of the 746-764 MHz and 776-794 MHz bands in the above-captioned proceeding ("700 MHz Band Rules Proceeding").[2]

In its Petition for Reconsideration or Clarification,[3] TRW urged the Federal Communications Commission ("FCC" or "Commission") to uphold its stated objective of expanding the commercial options available to consumers of service providers in these bands by implementing service-specific power limits in both sub-bands and/or by allowing power averaging in the two bands.[4] It further urged the Commission to measure such power levels and out-of-band emissions ("OOBE") in the 700 MHz bands over a reasonable time period of three microseconds.[5] Finally, TRW emphasized that clarifying the power limits so as to enable broadband wireless services would serve the public interest.[6]

As discussed briefly below, other parties' petitions in the 700 MHz Band Rules Proceeding lend broad credence and support to TRW's positions regarding these matters. TRW further requests that the Commission clarify the meaning of the new section 27.53 with respect to resolution bandwidth measurements. TRW opposes any call for higher standards to protect public

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2 Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules, First Report and Order, WT Docket No. 99-168 (released Jan. 7, 2000) ("700 MHz Band Order").

3 Petition for Reconsideration or Clarification of TRW Inc. (filed Feb. 11, 2000) ("TRW Petition").

4 See TRW Petition at 4-9.

5 See id. at 9-12.

6 See id. at 12-13.

safety operations in adjacent frequency bands. With respect to the general OOBE constraints only, TRW believes the Commission should establish a general OOBE constraint that parallels the levels set for the public safety bands.[7] In addition, TRW supports the Commission's imposition of a gradual reduction of out-of-band emissions ("OOBEs") in the bands immediately outside and adjacent to the frequency block.

I. Virtually All Major Petitioners Responding to the *700 MHz Band Order* Agree With TRW Regarding the Order's Adverse Effects on Broadband Deployment, and Support TRW's Proposal of Service-Specific Power Limits

Petitioners in the 700 MHz Band Rules Proceeding generally support TRW's assertion that the upper sub-band power limit[8] mandated by the 700 MHz Band Order in this proceeding would preclude deployment of broadband services and jeopardize the implementation of time division duplexing ("TDD") systems. For example, the ADAP Petition demonstrates that the power limits within the 700 MHz bands would render the upper band unusable for TDD and other wireless technologies.[9] The U S West Petition agrees that the Order inhibits broadband and TDD, thereby undermining the viability of the wireless uses the FCC purports to encourage.[10]

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7 TRW is not making any proposal at this time concerning OOBE levels required to protect the GPS bands, but supports continued strict control of OOBEs into the GPS bands.

8 See 700 MHz Band Order at ¶¶ 109-111 and Appendix B, p.7-8 (setting forth Section 27.50, "Power and antenna height limits").

9 ADAP Petition at 4.

10 U S West Petition at 7 n.19.

ArrayComm, Inc. also believes the Order does not adequately accommodate implementation of TDD systems.[11]

The petitions also reflect widespread support for TRW's contention that service-specific power thresholds–as opposed to band-specific, across-the-board limits–should be implemented to enable base, mobile or fixed operations in both the upper and lower sub-bands. Like TRW, ADAP suggests that the prescribed power limits in the 700 MHz Band Order be service equipment-specific instead of band-specific.[12] U S West states that power limits should allow base stations and subscriber-side equipment in both bands to accommodate TDD, and supports equipment-specific power limits.[13] With a slightly different take on the same underlying principle, but reiterating the need to get away from band-specific power limits, the Association for Maximum Service Television, Inc. ("MSTV") supports a flexible limit that permits different interference standards depending on actual spectrum use in a given geographic area.[14]

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[11] ArrayComm Petition at 11-12.

[12] ADAP Petition at 4.

[13] U S West Petition at 3-4.

[14] MSTV Petition at 5.

II. TRW Requests a Clarification of Technical Rules Sections 27.53(c) and (d), to Elucidate Whether the 6.35 kHz Adjustment Bandwidth Defined in Sections 27.53(c)(4) and (d)(4) is the Appropriate Measurement Resolution Bandwidth.

TRW asks that the Commission clarify the meaning of section 27.53, subsections (c) and (d), in terms of whether the rules' language applies to resolution bandwidth only or also to the bandwidth to which the measurement must be adjusted. Section 27.53(c)(3) appears to indicate the *resolution bandwidth* to be used in the measurement applied to §27.53(c)(1), but no direct mention is made of the *bandwidth to which the measurement is to be adjusted* and to which the 43 + 10 log (P) dB level applies. TRW reads the technical rules to mean that the 100 kHz and 30 kHz measurement resolution bandwidths mentioned in section 27.53(c)(3) are also intended to reflect the bandwidth to which the OOBE is to be adjusted. Similarly, it appears that the 6.25 kHz adjustment bandwidth defined in section 27.53(c)(4) is also intended to be taken as the measurement resolution bandwidth for that case. TRW requests clarification that this interpretation is correct.

Other areas of concern to TRW regarding the 700 MHz Band Order are affected by the outcome of this request for clarification of section 27.53. Some aspects of TRW's comments below in Parts III and IV herein are premised on an interpretation of the rule that sections 27.53(c) and (d) dictate the appropriate measurement resolution bandwidth.

III. TRW Opposes Any Call to Increase the OOBE Standards to Protect the Public Safety Bands From Interference.

TRW requests that the constraint on OOBEs into public safety bands remain at the level set forth in the 700 MHz Band Order. TRW disagrees with the call by the Association of Public-Safety Communications Officials-International, Inc. ("APCO") for stricter OOBE limits to protect adjacent public safety systems in the bands 764-776 and 794-806 MHz. With regard to APCO's request for reconsideration of the constraint on OOBEs into the public safety bands, TRW considers the 76 + 10 log (P) dB level for base stations to be a difficult but achievable goal for commercial wireless service providers. TRW believes that to significantly tighten the OOBE constraint beyond this level would be inconsistent with the Commission's stated goal of "strik[ing] a reasonable balance between protecting public safety and maintaining the commercial viability of this band."[15]

IV. TRW Supports ArrayComm, Inc.'s Request That General OOBE Constraints Be Increased Above the Level Set Forth in the *700 MHz Band Order.*

TRW supports ArrayComm, Inc.'s request that the general in-band OOBE constraints be tightened above the 43 + 10 log (P) dB level set forth in the 700 MHz Band Order. TRW believes that the OOBE level in the 700 MHz Band Order will potentially result in excessive interference to other operating bands, unduly restricting operation. While the affected bands would include portions of the 30 MHz spectrum used with TDD systems, the bands are not limited to such applications. TRW wishes to point out that the rules cited by the Commission as

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[15] 700 MHz Band Order at ¶ 104.

the basis for the OOBE constraint[16] refer to a measurement reference bandwidth of 1 MHz, and are therefore 10 dB more stringent than the Commission's 43 + 10 log (P) dB constraint, which is based on a 100 kHz measurement.[17] TRW also points out that the cited rules apply to spectrum in the 2.3 GHz band, where free space propagation loss increases much more quickly with distance (by about a factor of 10) than would occur at 700 MHz. Thus, the same rule results in significantly larger "dead zone" for 700 MHz than for 2.3 GHz.

Broadband interference at a 43 + 10 log (P) dB level emitted into spectrum being used by another broadband system will result in significant impairment, inhibiting operation in a "dead zone" of significant size around the offending emitter.[18] For example, a typical broadband system using one of the 5 MHz pieces of this 700 MHz UHF spectrum would require line-of-sight ("LOS") separation of approximately 4.8 km from a second broadband system operating in a different band to avoid interference issues (see Attachment A).[19] Extending the same rules established for OOBE into the adjacent public safety bands to apply as a general constraint on OOBEs would reduce this line-of-sight separation to about 430 meters–a more manageable

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16 "Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules", FCC 99-97, Docket No.99-168, released June 3, 1999, §69.

17 Part 27.53(a)(4)

18 While narrowband interference at this 43 + 10 log (P) dB level would pose less of a threat into wider band systems, OOBE generated by systems in these 700 MHz UHF bands are more likely to be of a broadband nature.

19 For base station-to-base station interference considerations, LOS between base stations operating in the same vicinity is to be expected.

prospect for commercial broadband service providers. Furthermore, given the existence of the more stringent OOBE rules established for the public safety bands by the 700 MHz Band Order, extending such stringent constraints beyond the public safety bands should not significantly affect equipment cost if proper design practices are employed. Therefore, TRW requests that the Commission extend the same OOBE limits applicable to emissions into the public safety bands to apply equally as a constraint on in-band OOBEs. Accordingly, a 76 + 10 log (P) dB level would apply to base stations, and a 65 + 10 log (P) dB level would apply to mobile and portable stations.

TRW further requests that the Commission maintain an allowance for gradual reduction of the OOBE in the bands immediately outside and adjacent to the frequency block. TRW requests that the Commission accomplish this by doing the following: 1) Maintain the current 43 + 10 log (P) dB OOBE constraint applied to 100 kHz measurement band in the 1 and 2 MHz guardbands, as defined in the 700 MHz Band Order;[20] 2) Maintain the form of the OOBE rule in the bands immediately outside and adjacent to the frequency block defined in the 700 MHz Band Order, Appendix B, section 27.53(c)(3), but slightly expand the size of the 100 kHz block to reflect and accommodate the tightening of the general OOBE recommended above. The 700 MHz Band Order allowed relaxed OOBE in a 100 kHz buffer band immediately outside and adjacent to the frequency block, in which a 30 kHz measurement bandwidth be employed. TRW requests that this established rule pertaining to the first 100 kHz adjacent to the frequency block be retained. TRW further requests that the general OOBE constraint of 43 + 10 log (P) dB as

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[20] 746-747 MHz, 762-764 MHz, 776-777 MHz and 792-794 MHz.

measured with a 100 kHz reference bandwidth established in the 700 MHz Band Order also be retained in the 500 kHz immediately outside and adjacent to the frequency block.

CONCLUSION

For the foregoing reasons, the FCC should adopt service-specific power limits in both 700 MHz sub-bands to enable TDD deployment in both bands, and general OOBE constraints that parallel the level set for the public safety bands. Only in this manner will the Commission effectively accomplish its goal of reasonably balancing the needs of commercial providers and public safety entities alike.

Respectfully submitted,

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March 10, 2000

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Attachment A

A brief analysis of the example presented in the text of the filing follows:

- OOBE emission constraint = 43 + 10logP, with reference measurement bandwidth of 100 kHz
- This OOBE corresponds to a level of –43 dBW/100 kHz or –63 dBm/Hz
- Typical receiver sensitivity is –90 dBm, also taken as the threshold of interference sensitivity.
- Assumed receiver bandwidth is 5 MHz
- Assumed (basestation) antenna gain is 10 dB
- Receiver sensitivity then equates to –90 – 10log(5 MHz) = -157.0 dBm/Hz
- Required propagation loss to avoid interference issues is then =
- OOBE – (recr sensitivity – antenna gain) =
- -63 dBm/Hz – (-157 dBm/Hz - 10 dB) = 104 dB
- Line-of-sight distance corresponding to 104 dB propagation loss in this 700 MHz band is roughly 4800 meters
- Note that tightening the OOBE emission constraint to be identical to the OOBE limits into the public safety bands modifies the analysis as follows:
- OOBE emission constraint becomes 76 + 10logP, with reference measurement bandwidth of 6.25 kHz
- This OOBE corresponds to a level of –84 dBm/Hz
- Required propagation loss to avoid interference issues becomes =
- OOBE – (recr sensitivity – antenna gain) =
- -84 dBm/Hz – (-157 dBm/Hz - 10 dB) = 83 dB
- Line-of-sight distance corresponding to 83 dB propagation loss in this 700 MHz band is roughly 430 meters

CERTIFICATE OF SERVICE

I, Tim Jordan, do hereby certify that copies of the foregoing "Consolidated Comments and Opposition of TRW Inc. to Petitions for Reconsideration and/or Clarification" were delivered this 10th day of March, 2000, to the following in the manner indicated:

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